
Descriptors for
Banana
(*Musa* spp.)



inibap



DEFINITIONS AND USE OF THE DESCRIPTORS

IPGRI now uses the following definitions in genetic resources documentation:

Passport descriptors: These provide the basic information used for the general management of the accession (including the registration at the genebank and other identification information) and describe parameters that should be observed when the accession is originally collected.

Management descriptors: These provide the basis for the management of accessions in the genebank and assist with their multiplication and regeneration.

Environment and site descriptors: These describe the environmental and site-specific parameters that are important when characterization and evaluation trials are held. They can be important for the interpretation of the results of those trials. Site descriptors for germplasm collecting are also included here.

Characterization descriptors: These enable an easy and quick discrimination between phenotypes. They are generally highly heritable, can be easily seen by the eye and are equally expressed in all environments. In addition, these may include a limited number of additional traits thought desirable by a consensus of users of the particular crop.

Evaluation descriptors: Many of the descriptors in this category are susceptible to environmental differences but are generally useful in crop improvement and others may involve complex biochemical or molecular characterization. They include yield, agronomic performance, stress susceptibilities and biochemical and cytological traits.

Characterization will normally be the responsibility of genebank curators, while evaluation will typically be carried out elsewhere (possibly by a multidisciplinary team of scientists). The evaluation data should be fed back to the genebank which will maintain a data file.

Minimum highly discriminating descriptors are marked with a star (★).

The following internationally accepted norms for the scoring, coding and recording of descriptor states should be followed:

- (a) the *Système International d'Unités* (SI system) is used. The units to be applied are given in square brackets following the descriptor name;
- (b) standard colour charts, e.g. Royal Horticultural Society Colour Chart, Methuen Handbook of Colour, or Munsell Color Chart for Plant Tissues, are strongly recommended for all ungraded colour characters (the precise chart used should be specified in the section where it is used);

- (c) many quantitative characters which are continuously variable are recorded on a 1-9 scale, where:

1	Very low	6	Intermediate to high
2	Very low to low	7	High
3	Low	8	High to very high
4	Low to intermediate	9	Very high
5	Intermediate		

is the expression of a character. The authors of this list have sometimes described only a selection of the states, e.g. 3, 5 and 7 for such descriptors. Where this has occurred, the full range of codes is available for use by extension of the codes given or by interpolation between them, e.g. in Section 9 (Biotic stress susceptibility) 1 = very low susceptibility and 9 = very high susceptibility;

- (d) when a descriptor is scored using a 1-9 scale, such as in (c), '0' would be scored when (i) the character is not expressed; (ii) when a descriptor is inapplicable. In the following example, '0' will be recorded if an accession does not have a central leaf lobe:

Shape of central leaf lobe

3	Toothed
5	Elliptic
7	Linear

- (e) absence/presence of characters is scored as in the following example:

Absence/presence of terminal leaflet

0	Absent
1 (or +)	Present

- (f) blanks are used for information not yet available;
- (g) for accessions which are not generally uniform for a descriptor (e.g. mixed collection, genetic segregation), the mean and standard deviation could be reported where the descriptor is continuous. Where the descriptor is discontinuous, several codes in the order of frequency could be recorded; or other publicized methods can be utilized, such as R.S. Rana *et al.* (1991), or van Hintum (1993), that clearly state a method for scoring heterogeneous accessions;
- (h) dates should be expressed numerically in the format DDMMYYYY, where

DD - 2 digits to represent the day
MM - 2 digits to represent the month
YYYY - 4 digits to represent the year.

PASSPORT

1. Accession descriptors

★ 1.1 **Accession number** (1.1)

This number serves as a unique identifier for accessions and is assigned when an accession is entered into the collection. Once assigned this number should never be reassigned to another accession in the collection. Even if an accession is lost, its assigned number is still not available for re-use. Letters should be used before the number to identify the genebank or national system (e.g. IDG indicates an accession that comes from the genebank at Bari, Italy; CGN indicates an accession from the genebank at Wageningen, The Netherlands; PI indicates an accession within the USA system).

1.2 **Donor name** (1.2)

Name of institution or individual responsible for donating the germplasm

1.3 **Donor number** (1.3)

Number assigned to an accession by the donor

1.4 **Other number(s) associated with the accession** (1.4)

Any other identification number known to exist in other collections for this accession, e.g. USDA Plant Inventory number (not **Collecting number**, see descriptor 2.3). Other numbers can be added as 1.4.3, etc.

1.4.1 **Other number 1** (1.4.1)

1.4.2 **Other number 2** (1.4.2)

★ 1.5 **Scientific name** (1.5)

1.5.1 **Genus** (1.5.1)

1.5.2 **Section** (1.5.2)

1.5.3 **Species/Group** (1.5.3)

Latin names should be given for wild species, e.g. *Musa acuminata*, and letters for cultivars, e.g. AA, AAA, AAB, etc.

1.5.4 **Subspecies/Subgroup** (1.5.4)

1.5.5 **Reference form/Cultivar** (1.5.5)

Either a registered or other formal designation given to the accession (e.g. 'Pisang Mas' is the reference name to be used for cultivars 'Figue sucrée', 'Amas', 'Kluai Khai', etc.)

1.6 **Pedigree** (1.6)

Parentage or nomenclature, and designations assigned to breeders' material. (In the case of an artificial hybrid only)

1.6.1 **Female parent**

1.6.2 **Male parent**

1.6.3 **Year of release/year of registration**

1.7 Accession



1.7.1 Accession name

Current name given to the accession in the collection

1.7.2 Local language

Language in which the accession name is given

1.7.3 Translation/Transliteration

Provide translation of the local accession name into English

1.7.4 Synonyms

Include here any previous identification other than the current name and the country. Collecting number or newly assigned station name are frequently used as identifiers.

1.8 Acquisition date [DDMMYYYY]

(1.7)

Date on which the accession entered the collection

★ **1.9 Type of material received**

1 *In vitro* plant

2 Sucker

3 Seed

4 Bud

5 Other (specify in descriptor **1.12 Notes**)

1.10 Accession size

(1.9)

Approximate number of plants of an accession in the genebank

1.11 Previous locations

Register other known previous locations of the accession, from the most recent to the oldest known location.

1.12 Notes

Any additional information may be specified here

2. Collecting descriptors

2.1 Collecting institute(s) (2.2)
Institute(s) and people collecting/sponsoring the sample collection

2.2 Site number
Number assigned to the physical site by the collector

★ **2.3 Collecting number** (2.1)
Original number assigned by the collector(s) of the sample, normally composed of the name or initials of the collector(s) followed by a number. This item is essential for identifying duplicates held in different collections. It should be unique and always accompany subsamples wherever they are sent.

2.4 Collecting date of original sample [DDMMYYYY] (2.3)

★ **2.5 Country of collecting** (2.4)
Name of the country in which the sample was collected or bred. Use the three-letter abbreviations from the *International Standard (ISO) Codes for the representation of names of countries*, No. 3166, 4th Edition. Copies of these are available from DIN: Deutsche Institut für Normung e.V., 10772 Berlin, Germany; Tel. 30-2601-2860; Fax 30-2601-1231, Tlx. 184 273-din-d.

2.6 Province/State (2.5)
Name of the primary administrative subdivision of the country in which the sample was collected

2.7 Department/County
Name of the secondary administrative subdivision (within a Province/State) of the country in which the sample was collected

2.8 Location of collecting site (2.6)
Distance in kilometers and direction from the nearest town, village or map grid reference point (e.g. CURITIBA 7S means 7 km south of Curitiba)

2.9 Latitude of collecting site (2.7)
Degrees and minutes followed by N (North) or S (South) (e.g. 1030S)

2.10 Longitude of collecting site (2.8)
Degrees and minutes followed by E (East) or W (West) (e.g. 07625W)

2.11 Elevation of collecting site [m asl] (2.9)

★ **2.12 Collecting source** (2.10)

- 1 Wild habitat
 - 1.1 Forest/woodland
 - 1.2 Shrubland
 - 1.3 Grasslands
 - 1.4 Desert/tundra
- 2 Farm
 - 2.1 Field
 - 2.2 Orchard
 - 2.3 Garden
 - 2.4 Fallow
 - 2.5 Pasture
 - 2.6 Store
- 3 Market
 - 3.1 Town
 - 3.2 Village
 - 3.3 Urban area (around city)
 - 3.4 Other exchange system
- 4 Institute/Research organization
- 5 Other (specify in descriptor **2.29 Collector's notes**)

2.13 Collecting source environment

Use descriptors **5.1.1** to **5.1.22** in section 5

★ **2.14 Type of sample** (2.15)

Form of sample collected. If different types of material were collected from the same source, each sample type should be designated with a unique collecting number and a corresponding unique accession number

- 1 Sucker
- 2 Seed
- 3 Bud
- 4 Other (specify in descriptor **2.29 Collector's notes**)

2.15 Status of sample (2.11)

- 1 Wild
- 2 Weedy
- 3 Primitive cultivar/Landrace
- 4 Breeders line
- 5 Advanced cultivar
- 6 Unknown
- 7 Other (specify in descriptor **2.29 Collector's notes**)

- ★ **2.16 Local/vernacular name** (2.12)
Name given by farmer to crop and cultivar/landrace/weed. State language and dialect if the ethnic group is not provided

- 2.17 Ethnic group**
Name of the tribe of the farmer donating the sample or of the people living in the area of collecting

2.18 Cultural situation

2.18.1 Status of plantation

- 1 Backyard
- 2 Smallholding (<5 ha)
- 3 Midsize holding (5 - 10 ha)
- 4 Plantation (>10 ha)

2.18.2 Cropping system

2.18.2.1 Monoculture (pure banana stand)

2.18.2.2 Mixed cropping

- 1 Mostly tree crops (e.g. citrus, coconut, cocoa, mango, coffee, specify crop in descriptor **2.29 Collector's notes**)
- 2 Mostly food crops (e.g. maize, millet, tuber crops, specify crop in descriptor **2.29 Collector's notes**)

2.19 Associated flora

Other dominant crop/plant species, found in and around the collecting site

2.20 Number of plants sampled

2.21 Plant population density

- 3 Low
- 5 Intermediate
- 7 High

2.22 Uses of the fruit

- 1 Dessert
- 2 Cooking
- 3 Beer/brew/wine
- 4 Animal feed
- 5 Medicinal
- 6 Other (specify in descriptor **2.29 Collector's notes**)

2.23 Other parts of the plant used

- 1 Leaves
- 2 Pseudostem
- 3 Male bud
- 4 Flowers
- 5 Corm
- 6 Sheath
- 7 Other (specify in descriptor **2.29 Collector's notes**)

2.24 Uses of other parts of the plant

- 1 Textile
- 2 Building
- 3 Food
- 4 Ornamental
- 5 Other (specify in descriptor **2.29 Collector's notes**)

2.25 Photograph (2.14)

Was a photograph(s) taken of the accession or habitat at the time of collecting? If so, provide an identification number(s) in descriptor **2.29 Collector's notes**.

- 0 No
- 1 Yes

2.26 Herbarium specimen

Was a herbarium specimen collected? If so, provide an identification number in descriptor

2.29 Collector's notes.

- 0 No
- 1 Yes

2.27 Prevailing stresses

Information on associated biotic and abiotic stresses and the accession's reaction. Indicate if disease indexing was done at the time of collecting in descriptor **2.29 Collector's notes**.

2.28 Post-movement activities data

Use descriptors **3.8.1** and **3.8.2** in section 3

2.29 Collector's notes

Additional information recorded by the collector or any specific information on any state in any of the above descriptors

MANAGEMENT

3. Management descriptors

★ 3.1 Accession number (Passport 1.1)

3.2 Population identification (Passport 2.3)
(Collecting number, pedigree, cultivar name, etc. depending on the population type)

★ 3.3 Type of maintenance of the accession (1.11)

- 1 *In vivo*
- 2 *In vitro*
- 3 Seed
- 4 Other (specify in descriptor 3.9 Notes)

3.4 Availability for exchange

- 0 No
- 1 Yes

3.5 Import procedures

3.5.1 Import permit needed

- 0 No
- 1 Yes

3.5.2 Phytosanitary certificate needed

- 0 No
- 1 Yes

3.5.3 Quarantine required

- 0 No
- 1 Yes

3.6 Export procedures

3.6.1 Import permit from receiving country needed

- 0 No
- 1 Yes

3.6.2 Export permit needed

- 0 No
- 1 Yes

3.6.3 Other (specify in descriptor 3.9 Notes)

3.7 Location of duplicates of this accession

3.8 Pre- and post-movement activities data

3.8.1 Treatment of sample during the mission

Note all relevant information on how the sample was treated between its collection and the deposit at its destination

3.8.2 Destination of the accession

Note where the sample is sent after it has been collected. Specify the institution, the name of the collection or station, the address and country

- 1 Collection
- 2 Intermediate holding station

3.9 Notes

Any additional information may be specified here

ENVIRONMENT AND SITE

4. Characterization and/or evaluation site descriptors

4.1 Country of characterization and/or evaluation (3.1)
(See instructions in descriptor 2.5 **Country of collecting**)

4.2 Site (research institute) (3.2)

4.2.1 Latitude
Degrees and minutes followed by N (North) or S (South) (e.g. 1030S)

4.2.2 Longitude
Degrees and minutes followed by E (East) or W (West) (e.g. 07625 W)

4.2.3 Elevation [m asl]

4.2.4 Name of farm or institute

4.3 Evaluator's name and address (3.3)

4.4 Planting date [DDMMYYYY] (3.4)

4.5 Harvest date [DDMMYYYY] (3.5)

4.6 Evaluation environment

Environment in which characterization/evaluation was carried out

- 1 Field
- 2 Screenhouse
- 3 Glasshouse
- 4 Laboratory
- 5 Other (specify in descriptor 4.13 **Notes**)

4.7 Planting site in the field

Give block, strip and/or row/plot numbers as applicable, plants/plot, replication

4.8 Field spacing

4.8.1 Distance between plants in a row [m]

4.8.2 Distance between rows [m]

4.9 Cropping system

(See descriptor 2.18.2)

4.10 Environmental characteristics of site

Use descriptors 5.1.1 to 5.1.22 in section 5

4.11 Fertilizer

Specify types, doses, frequency of each and method of application

4.12 Plant protection

Specify pesticides used, doses, frequency of each and method of application

4.13 Notes

Any other site-specific information

5. Collecting and/or characterization/evaluation site environment descriptors

5.1 Site environment

★ **5.1.1 Topography**

This refers to the profile in elevation of the land surface on a broad scale. The reference is FAO (1990)

1	Flat	0 - 0.5%
2	Almost flat	0.6 - 2.9%
3	Gently undulating	3 - 5.9%
4	Undulating	6 - 10.9%
5	Rolling	11 - 15.9%
6	Hilly	16 - 30%
7	Steeply dissected	>30%, moderate elevation range
8	Mountainous	>30%, great elevation range (>300 m)
9	Other	(specify in appropriate section's Notes)

★ **5.1.2 Higher level landform (general physiographic features)**

The landform refers to the shape of the land surface in the area in which the site is located (adapted from FAO 1990)

- 1 Plain
- 2 Basin
- 3 Valley
- 4 Plateau
- 5 Upland
- 6 Hill
- 7 Mountain

5.1.3 Land element and position

Description of the geomorphology of the immediate surroundings of the site (adapted from FAO 1990). (See Fig. 1)

- | | | | |
|----|-------------------|----|--|
| 1 | Plain level | 15 | Dune |
| 2 | Escarpment | 16 | Longitudinal dune |
| 3 | Interfluv | 17 | Interdunal depression |
| 4 | Valley | 18 | Mangrove |
| 5 | Valley floor | 19 | Upper slope |
| 6 | Channel | 20 | Midslope |
| 7 | Levee | 21 | Lower slope |
| 8 | Terrace | 22 | Ridge |
| 9 | Floodplain | 23 | Beach |
| 10 | Lagoon | 24 | Beachridge |
| 11 | Pan | 25 | Rounded summit |
| 12 | Caldera | 26 | Summit |
| 13 | Open depression | 27 | Coral atoll |
| 14 | Closed depression | 28 | Drainage line (bottom position in flat or almost-flat terrain) |
| | | 29 | Coral reef |
| | | 30 | Other (specify in appropriate section's Notes) |

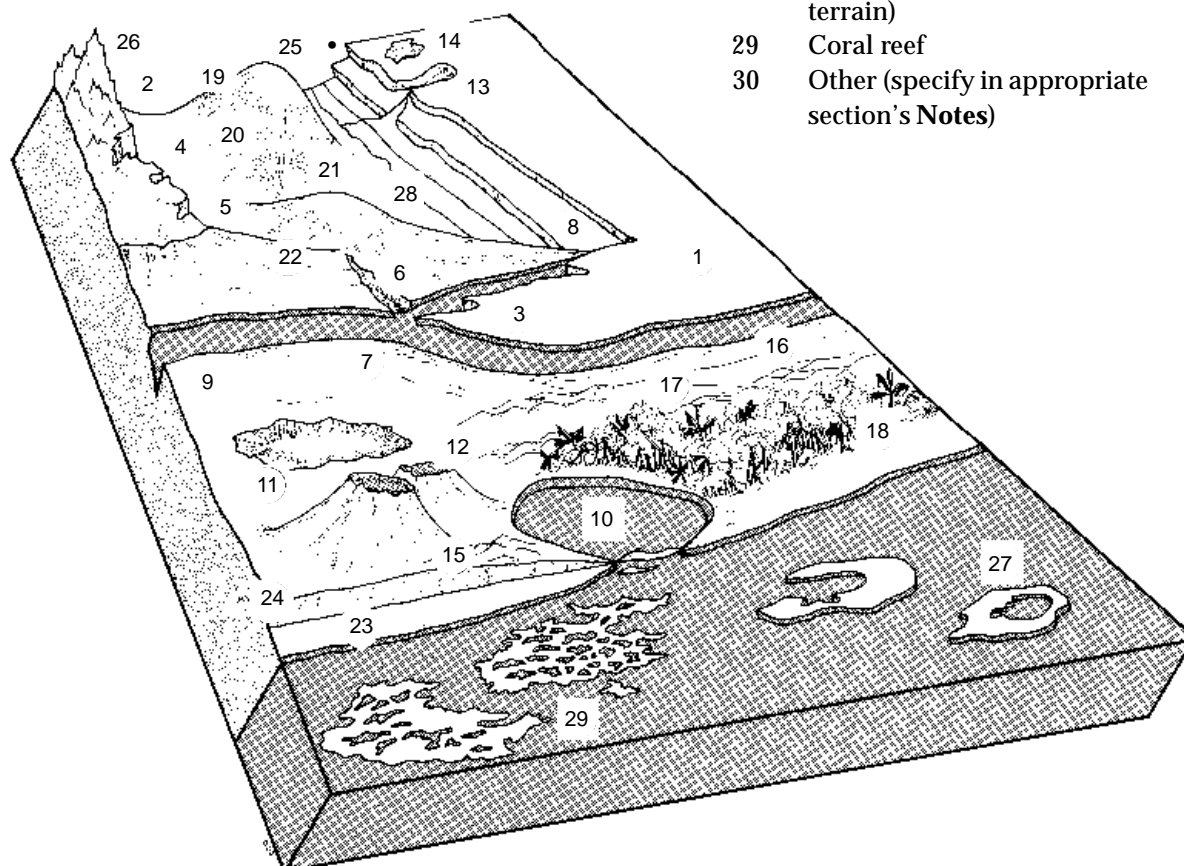


Fig. 1 Land element and position

5.1.4 Slope [°]

Estimated slope of the site

5.1.5 Slope aspect

The direction that the slope on which the accession was collected faces. Describe the direction with symbols N, S, E, W (e.g. a slope that faces a southwestern direction has an aspect of SW)

5.1.6 Crop agriculture

(From FAO 1990)

- 1 Annual field cropping
- 2 Intermediate
- 3 Perennial field cropping

5.1.6.1 Replanting rate

Provide the average number of production cycles referring to a single planting

5.1.7 Overall vegetation surrounding and at the site

(From FAO 1990)

- 1 Grassland (Grasses, subordinate forbs, no woody species)
- 2 Forbland (Herbaceous plants predominant)
- 3 Forest (Continuous tree layer, crowns overlapping, large number of tree and shrub species in distinct layers)
- 4 Woodland (Continuous tree layer, crowns usually not touching, understorey may be present)
- 5 Shrubland (Continuous layer of shrubs, crowns touching)
- 6 Savanna (Grasses with a discontinuous layer of trees or shrubs)
- 7 Other (specify in appropriate section's **Notes**)

5.1.8 Soil parent material

(Adapted from FAO 1990)

Two lists of examples of parent material and rock are given below. The reliability of the geological information and the knowledge of the local lithology will determine whether a general or a specific definition of the parent material can be given. Saprolite is used if the *in situ* weathered material is thoroughly decomposed, but still showing rock structure. Alluvial deposits and colluvium derived from a single rock type may be further specified by that rock type.

5.1.8.1 Unconsolidated material

- | | |
|----------------------------------|-----------------------|
| 1 Aeolian deposits (unspecified) | 5 Marine deposits |
| 2 Aeolian sand | 6 Lacustrine deposits |
| 3 Littoral deposits | 7 Fluvial deposits |
| 4 Lagoonal deposits | 8 Alluvial deposits |

- | | |
|--------------------------------|---|
| 9 Unconsolidated (unspecified) | 15 Colluvial deposits |
| 10 Volcanic ash | 16 <i>In situ</i> weathered |
| 11 Loess | 17 Saprolite |
| 12 Pyroclastic deposits | 18 Other (specify in appropriate section's Notes) |
| 13 Glacial deposits | |
| 14 Organic deposits | |

5.1.8.2 Rock type

- | | |
|--------------------------------------|---|
| 1 Acid igneous/
metamorphic rock | 16 Limestone |
| 2 Granite | 17 Dolomite |
| 3 Gneiss | 18 Sandstone |
| 4 Granite/gneiss | 19 Quartzitic sandstone |
| 5 Quartzite | 20 Shale |
| 6 Schist | 21 Marl |
| 7 Andesite | 22 Travertine |
| 8 Diorite | 23 Conglomerate |
| 9 Basic igneous/
metamorphic rock | 24 Siltstone |
| 10 Ultra basic rock | 25 Tuff |
| 11 Gabbro | 26 Pyroclastic rock |
| 12 Basalt | 27 Evaporite |
| 13 Dolerite | 28 Gypsum rock |
| 14 Volcanic rock | 29 Other (specify in appropriate section's Notes) |
| 15 Sedimentary rock | 30 Not known |

5.1.9 Stoniness/rockiness/hardpan/cementation

- 1 Tillage unaffected
- 2 Tillage affected
- 3 Tillage difficult
- 4 Tillage impossible
- 5 Essentially paved

5.1.10 Soil drainage

(Adapted from FAO 1990)

- 3 Poorly drained
- 5 Moderately drained
- 7 Well drained

5.1.11 Soil salinity

- 1 <160 ppm dissolved salts
- 2 160 - 240 ppm
- 3 241 - 480 ppm
- 4 >480 ppm

★ **5.1.12 Soil depth to groundwater table**

(Adapted from FAO 1990)

The depth to the groundwater table, if present, as well as an estimate of the approximate annual fluctuation, should be given. The maximum rise of the groundwater table can be inferred approximately from changes in profile colour in many, but not all, soils.

- 1 0 - 25 cm
- 2 25.1 - 50 cm
- 3 50.1 - 100 cm
- 4 100.1 - 150 cm
- 5 >150 cm

5.1.13 Soil matrix colour

(Adapted from FAO 1990)

The colour of the soil matrix material in the root zone around the accession is recorded in the moist condition (or both dry and moist condition, if possible) using the notation for hue, value and chroma as given in the Munsell Soil Color Charts (Munsell 1977). If there is no dominant soil matrix colour, the horizon is described as mottled and two or more colours are given and should be registered under uniform conditions. Early morning and late evening readings are not accurate. Provide depth of measurement (cm). If colour chart is not available, the following states may be used:

- | | | |
|-----------------|--------------------|-----------------|
| 1 White | 7 Reddish brown | 13 Greyish |
| 2 Red | 8 Yellowish brown | 14 Blue |
| 3 Reddish | 9 Yellow | 15 Bluish-black |
| 4 Yellowish red | 10 Reddish yellow | 16 Black |
| 5 Brown | 11 Greenish, green | |
| 6 Brownish | 12 Grey | |

★ **5.1.14 Soil pH**

Actual value of the soil within the following root depths around the accession

- 5.1.14.1 pH at 10-15 cm
- 5.1.14.2 pH at 16-30 cm
- 5.1.14.3 pH at 31-60 cm
- 5.1.14.4 pH at 61-90 cm

★ **5.1.15 Soil erosion**

- 3 Low
- 5 Intermediate
- 7 High

5.1.16 Rock fragments

(Adapted from FAO 1990)

Large rock and mineral fragments (>2 mm) are described according to abundance

1	0 - 2%	4	15.1 - 40%
2	2.1 - 5%	5	40.1 - 80%
3	5.1 - 15%	6	>80%



5.1.17 Soil texture classes

(Adapted from FAO 1990)

For convenience in determining the texture classes of the following list, particle size classes are given for each of the fine earth fractions below. (See Fig. 2)

1	Clay	12	Coarse sandy loam
2	Loam	13	Loamy sand
3	Clay loam	14	Loamy very fine sand
4	Silt	15	Loamy fine sand
5	Silty clay	16	Loamy coarse sand
6	Silty clay loam	17	Very fine sand
7	Silt loam	18	Fine sand
8	Sandy clay	19	Medium sand
9	Sandy clay loam	20	Coarse sand
10	Sandy loam	21	Sand, unsorted
11	Fine sandy loam	22	Sand, unspecified

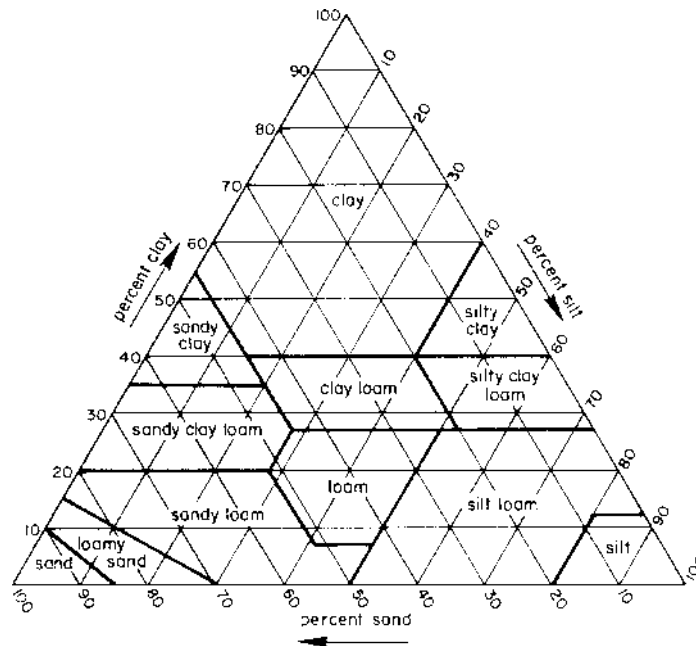


Fig. 2 Soil texture classes

5.1.17.1 Soil particle size classes

(Adapted from FAO 1990)

1	Clay	< 2 µm
2	Fine silt	2 - 20 µm
3	Coarse silt	21 - 63 µm
4	Very fine sand	64 - 125 µm
5	Fine sand	126 - 200 µm
6	Medium sand	201 - 630 µm
7	Coarse sand	631 - 1250 µm
8	Very coarse sand	1251 - 2000 µm

★ **5.1.18 Soil taxonomic classification**

As detailed a classification as possible should be given. This may be taken from a soil survey map. State class (e.g. Alfisols, Spodosols, Vertisols, etc.).

★ **5.1.19 Water availability**

- 1 Rainfed
- 2 Irrigated
- 3 Flooded
- 4 River banks
- 5 Sea coast
- 6 Other (specify in appropriate section's **Notes**)

★ **5.1.20 Soil fertility**

General assessment of the soil fertility based on existing vegetation

- 3 Low
- 5 Moderate
- 7 High

5.1.21 Climate of the site

Should be assessed as close to the site as possible

★ **5.1.21.1 Temperature [°C]**

Provide either the diurnal (mean, maximum, minimum) or the seasonal (mean, maximum, minimum)

★ **5.1.21.2 Rainfall [mm]**

Provide either annual average and seasonal rainfall distribution (state number of recorded years)

5.1.21.3 Wind [km/s]

Annual average (state number of years recorded)

5.1.21.3.1 Frequency of typhoons or hurricane force winds

5.1.21.3.2 Date of most recent typhoons or hurricane force winds
[DDMMYYYY]

5.1.21.3.3 Annual maximum wind velocity [km/s]

5.1.21.4 Frost

5.1.21.4.1 Date of most recent frost [DDMMYYYY]

5.1.21.4.2 Lowest temperature [°C]

Specify seasonal average and minimum survived

5.1.21.4.3 Duration of temperature below freezing [d]

5.1.21.5 Relative humidity

5.1.21.5.1 Relative humidity diurnal range [%]

5.1.21.5.2 Relative humidity seasonal range [%]

5.1.21.6 Light

3 Shady

7 Sunny

5.1.22 Other

Any additional information may be specified here

CHARACTERIZATION

Observations should be made ideally under standardized conditions. Most characters should be observed during the 2nd cycle of cultivation (ratoon crop), or from the plant crop if ratoon crop is not possible to obtain. Characters should be recorded when the first ripe fruit develop on the bunch unless otherwise specified. It is recommended that at least three plants growing near to each other be used in the appraisal.

Two detachable colour charts (A and B) are provided to aid decisions on colour

6. Plant descriptors

6.1 Plant general appearance

★ 6.1.1 Leaf habit (See Fig. 3)

- 1 Erect
- 2 Intermediate
- 3 Drooping
- 4 Other (e.g. very drooping, specify in descriptor Notes, 6.8)

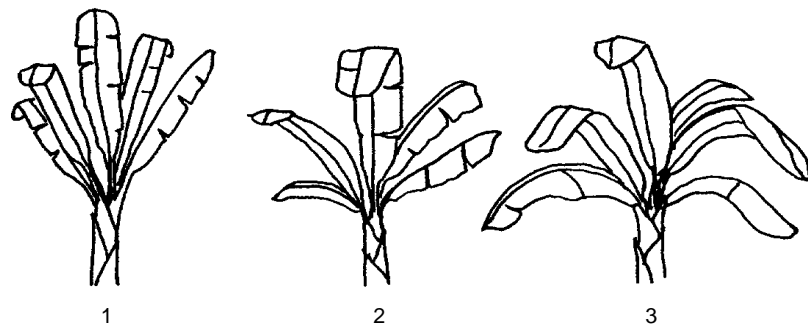


Fig. 3 Leaf habit

★ 6.1.2 Dwarfism

- 1 Normal: leaves not overlapped and leaf ratio inferior to 2.5
- 2 Dwarf type: leaves strongly overlapped and leaf ratio superior to 2.5

6.2 Pseudostem/suckers

(See Fig. 4)

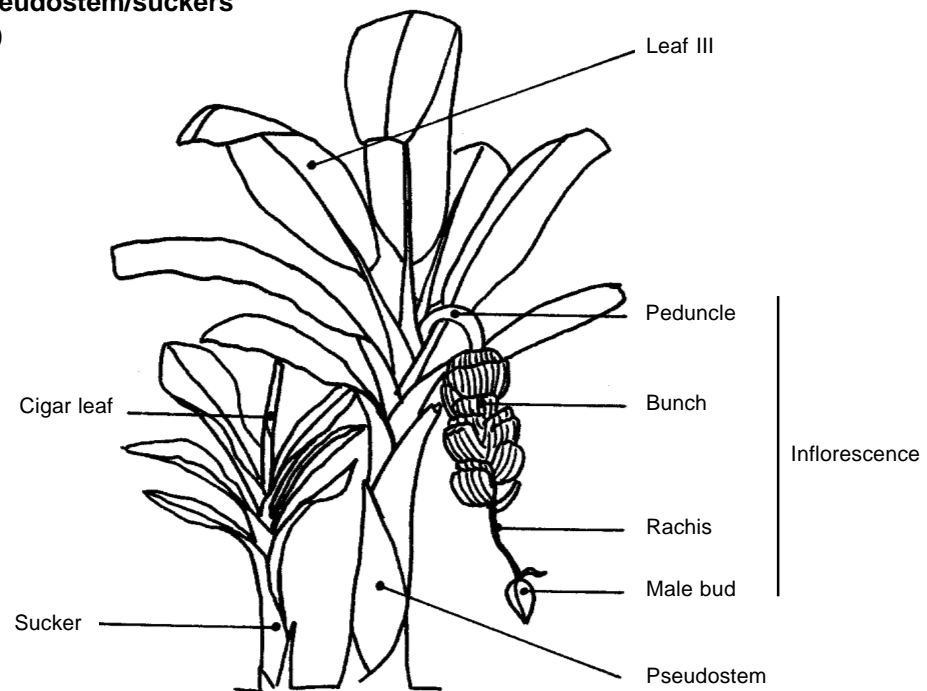


Fig. 4 Pseudostem/suckers (adapted from Champion, 1963)

★ 6.2.1 Pseudostem height [m] (4.1.1)

Recorded from the base of pseudostem to emerging point of the peduncle

- 1 ≤ 2
- 2 2.1 to 2.9
- 3 ≥ 3

★ 6.2.2 Pseudostem aspect

Determined by the circumference at 100 cm

- 1 Slender
- 2 Normal
- 3 Robust

- ★ **6.2.3 Pseudostem colour** (6.1.1)
Recorded without removing the external sheaths. The colour of oldest dry sheaths should not be considered. (Chart A)

- 1 Green-yellow
- 2 Medium green
- 3 Green
- 4 Dark green
- 5 Green-red
- 6 Red
- 7 Red-purple
- 8 Blue
- 9 Chimerical
- 10 Other (specify in descriptor **Notes, 6.8**)

6.2.4 Pseudostem appearance

Recorded as in **6.2.3**

- 1 Dull (waxy)
- 2 Shiny (not waxy)

6.2.5 Predominant underlying colour of the pseudostem

Remove the outermost sheath from the pseudostem and look at the exposed surface of the underlying pseudostem. The values 5 (pink-purple), 6 (red-purple) and 7 (purple) must be chosen only if the pigmentation is uniform, and green tinges are not observed. (Chart A)

- 1 Watery green
- 2 Light green
- 3 Green
- 4 Cream
- 5 Pink-purple
- 6 Red-purple
- 7 Purple
- 8 Other (specify in descriptor **Notes, 6.8**)

- ★ **6.2.6 Pigmentation of the underlying pseudostem** (4.1.3)
Record the tinge of pigmentation, even if it is only noticeable in places. (Chart A)

- 1 Pink-purple
- 2 Red
- 3 Purple
- 4 Other (specify in descriptor **Notes, 6.8**)

- ★ **6.2.7 Sap colour**
Cut the external sheath of pseudostem and record the characteristics of the sap.
(Chart A)
- 1 Watery
 - 2 Milky
 - 3 Red-purple
 - 4 Other (specify in descriptor **Notes, 6.8**)
- 6.2.8 Wax on leaf sheaths** (4.1.4)
- 1 Very little or no visible sign of wax
 - 2 Very few wax
 - 3 Moderately waxy
 - 4 Very waxy
- ★ **6.2.9 Number of suckers** (4.1.2)
Record the number of suckers from soil level to point of emergence of the last leaf (>30 cm height). Recorded only if no desuckering has taken place
- ★ **6.2.10 Development of suckers**
In relation to the parent plant. Observed on the tallest sucker. Recorded at harvest time
- 1 Taller than parent plant
 - 2 More than 3/4 of the height of the parent plant
 - 3 Between 1/4 and 3/4 of the height of the parent plant
 - 4 Inhibited
- 6.2.11 Position of suckers**
- 1 Far from parent plant (emerging >50 cm from parent plant)
 - 2 Close to parent (vertical growth)
 - 3 Close to parent (growing at an angle)

6.3 Petiole/midrib/leaf

Recorded on the third, fully unfolded leaf counting down from the top of the plant. (See Fig. 5)

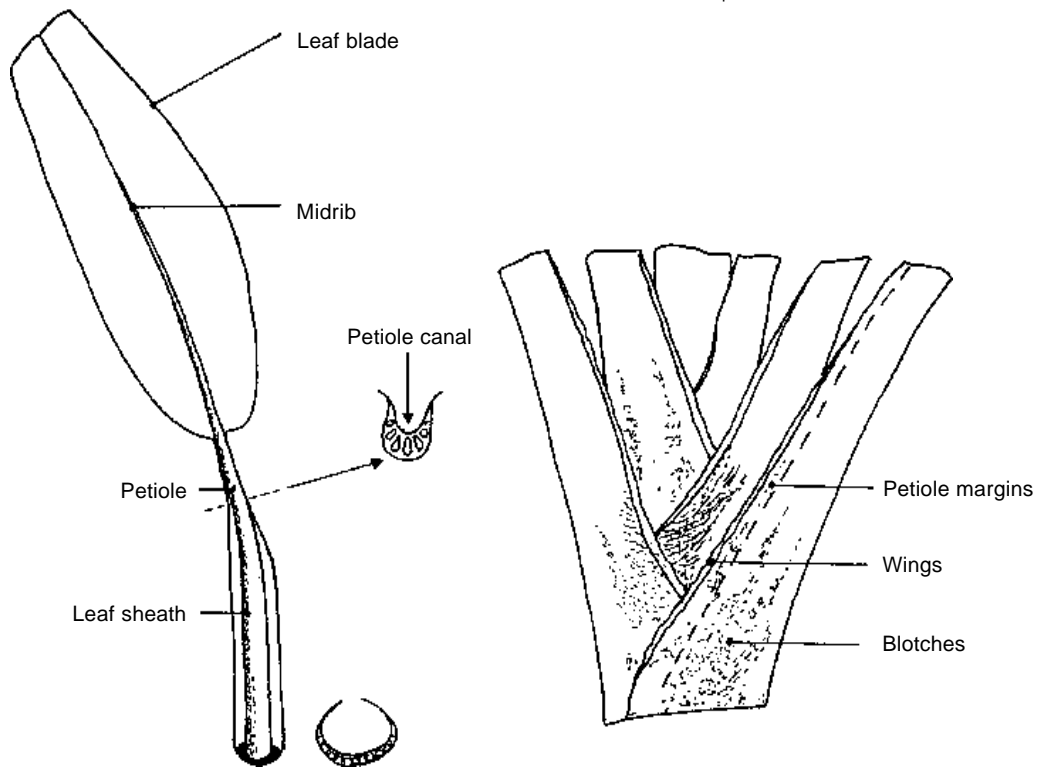


Fig. 5 Petiole/midrib/leaf (from Champion 1963 (left), De Langhe 1961 (right))

★ 6.3.1 Blotches at the petiole base (See Fig. 5)

- 1 Sparse blotching
- 2 Small blotches
- 3 Large blotches
- 4 Extensive pigmentation
- 5 Without pigmentation

★ 6.3.2 Blotches colour

- 1 Brown
- 2 Dark brown
- 3 Brown-black
- 4 Black-purple
- 5 Other (specify in descriptor Notes, 6.8)



6.3.3 Petiole canal leaf III

Leaf III is the third leaf counted from the last leaf (leaf I) produced before bunch emergence. Cut the petiole half way between the pseudostem and the leaf blade and examine the cross section. (See Figs. 4 and 6)

- 1 Open with margins spreading
- 2 Wide with erect margins
- 3 Straight with erect margins
- 4 Margins curved inward
- 5 Margins overlapping

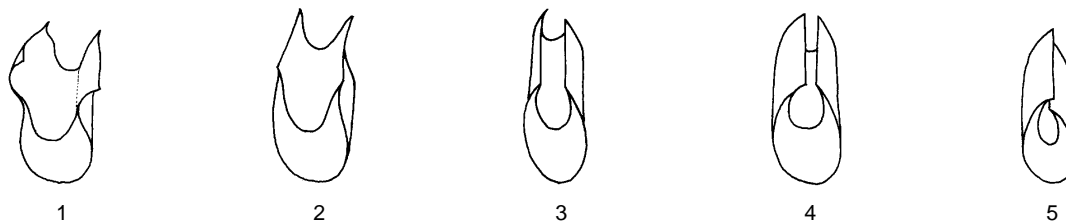


Fig. 6 Petiole canal leaf III

For descriptors **6.3.4 to 6.3.8** observations on the margins and petiole wings should be made where the petiole and pseudostem meet

6.3.4 Petiole margins (4.1.5)

- 1 Winged and undulating
- 2 Winged and not clasping the pseudostem
- 3 Winged and clasping the pseudostem
- 4 Not winged and clasping the pseudostem
- 5 Not winged and not clasping the pseudostem

6.3.5 Wing type

- 1 Dry
- 2 Not dry

6.3.6 Petiole margin colour

(Chart A)

- 1 Green
- 2 Pink-purple to red
- 3 Purple to blue
- 4 Other (specify in descriptor **Notes, 6.8**)

6.3.7 Edge of petiole margin

- 1 Colourless (without a colour line along)
- 2 With a colour line along

6.3.8 Petiole margin width [cm]

- 1 ≤ 1 cm
- 2 > 1 cm
- 3 Cannot be defined

6.3.9 Leaf blade length [cm]

Measured at its maximum point

- 1 ≤ 170 cm
- 2 171 to 220 cm
- 3 221 to 260 cm
- 4 ≥ 261 cm

6.3.10 Leaf blade width [cm]

Measured at its maximum point

- 1 ≤ 70 cm
- 2 71 to 80 cm
- 3 81 to 90 cm
- 4 ≥ 91 cm

6.3.10.1 Leaf ratio

- 3 ≤ 2
- 5 2.4 to 2.6
- 7 ≥ 3

6.3.11 Petiole length [cm]

Recorded from the pseudostem to the lamina

- 1 ≤ 50 cm
- 2 51 to 70 cm
- 3 ≥ 71 cm

6.3.12 Colour of leaf upper surface

(Chart A)

- 1 Green-yellow
- 2 Medium green
- 3 Green
- 4 Dark green
- 5 Dark green with red-purple (presence of large blotches of red-purple)
- 6 Blue
- 7 Other (specify in descriptor **Notes, 6.8**)

6.3.13 Appearance of leaf upper surface

- 1 Dull
- 2 Shiny

6.3.14 Colour of leaf lower surface

(Wax removed). (Chart A)

- | | | | |
|---|--------------|---|------------------------|
| 1 | Green-yellow | 5 | Blue |
| 2 | Medium green | 6 | Red-purple |
| 3 | Green | 7 | Other (specify in |
| 4 | Dark green | | descriptor Notes, 6.8) |

6.3.15 Appearance of leaf lower surface

- 1 Dull
- 2 Shiny

6.3.16 Wax on leaves

Recorded on the lower surface

- 1 Very little or no visible sign of wax
- 2 Few wax
- 3 Moderately waxy
- 4 Very waxy

6.3.17 Insertion point of leaf blades on petiole

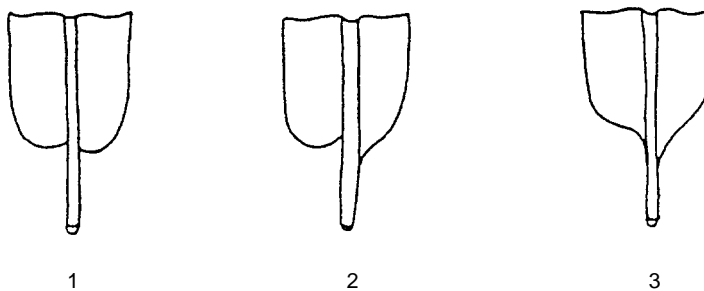
- 1 Symmetric
- 2 Asymmetric

6.3.18 Shape of leaf blade base

(4.1.6)

(See Fig. 7)

- 1 Both sides rounded
- 2 One side rounded, one pointed
- 3 Both sides pointed

**Fig. 7 Shape of leaf blade base**

6.3.19 Leaf corrugation

Presence of ridges perpendicular to the secondary ribs on the leaf upper surface

- 1 Even, smooth
- 2 Few stripes
- 3 Very corrugated

★ **6.3.20 Colour of midrib dorsal surface**

If pigmentation is seen, options are 4, 5 or 6. (Chart A)

- 1 Yellow
- 2 Light green
- 3 Green
- 4 Pink-purple
- 5 Red-purple
- 6 Purple to blue
- 7 Other (specify in descriptor **Notes, 6.8**)

6.3.21 Colour of midrib ventral surface

If pigmentation is seen, options are 4, 5 or 6. (Chart A)

- 1 Yellow
- 2 Light green
- 3 Green
- 4 Pink-purple
- 5 Red-purple
- 6 Purple to blue
- 7 Other (specify in descriptor **Notes, 6.8**)

★ **6.3.22 Colour of cigar leaf dorsal surface**

Look at the visible face (future lower face) of the cigar leaf before it is unfurled and before the plant flowers. (Chart A)

- 1 Green
- 2 Red-purple
- 3 Other (specify in descriptor **Notes, 6.8**)

★ **6.3.23 Blotches on leaves of water suckers**

Observed on young, non inhibited water suckers (if the lamina is sword shaped, it is not a water sucker)

- 1 Without blotches
- 2 Little or narrow blotches
- 3 Large purple blotches

6.4 Inflorescence / male bud

★ 6.4.1 Peduncle length [cm]

Measured from the leaf crown to the first hand of fruit

- 1 ≤30 cm
- 2 31 - 60 cm
- 3 ≥61 cm

6.4.2 Empty nodes on peduncle

Record the number of empty nodes between the last bract-leaf and first hand of fruit

6.4.3 Peduncle width [cm]

Recorded at mid-length

- 1 ≤6 cm
- 2 7 - 12 cm
- 3 ≥13 cm

6.4.4 Peduncle colour

Descriptor state 4 (red/or pink-purple) is green homogeneously tinged with red (purple green appearance). When pigmentation is scattered, use state 5. (Chart A)

- 1 Light green
- 2 Green
- 3 Dark green
- 4 Red or pink/purple
- 5 With purple-brown to blue blotches
- 6 Other (specify in descriptor **Notes, 6.8**)

★ 6.4.5 Peduncle hairiness (4.2.2)

- 1 Hairless
- 2 Slightly hairy
- 3 Very hairy, short hairs (similar to velvet touch)
- 4 Very hairy, long hairs (>2 mm)

★ 6.4.6 Bunch position

(Position of the fruit-bearing part). Angle from vertical to the general axis of the bunch

- 1 Hanging vertically
- 2 Slightly angled
- 3 Hanging at angle 45°
- 4 Horizontal
- 5 Erect

6.4.7 Bunch shape

- 1 Cylindrical
- 2 Truncated cone shape
- 3 Asymmetric - Bunch axis is nearly straight
- 4 With a curve in the bunch axis
- 5 Spiral (all fruit is attached to a unique crown coiled around the stalk)

6.4.8 Bunch appearance

- 1 Lax (one can easily place one's hand between the hands of fruit)
- 2 Compact (one can place one's finger, but not one's hand, between the hands of fruit)
- 3 Very compact (one cannot place one's finger between the hands of fruit)

6.4.9 Flowers that form the fruit

(4.2.3)

Record at flowering if the flowers of the first hands bear apparently functional stamens

- 1 Female (absence of pollen sacs or pollens)
- 2 Hermaphrodite (presence of pollen sacs and pollens)



6.4.10 Fruits

Positioning of fruits on the crown

- 1 Uniseriate
- 2 Biseriate
- 3 Biseriate and fused

For the following descriptors, observe only that part of the rachis between the last hand of fruit and the male bud



6.4.11 Rachis type

- 1 Truncated, no bract scar below the last hand of fruit
- 2 Present and male bud may be degenerated or persistent



6.4.12 Rachis position

(See Fig. 8)

- 1 Falling vertically
- 2 At an angle
- 3 With a curve
- 4 Horizontal
- 5 Erect

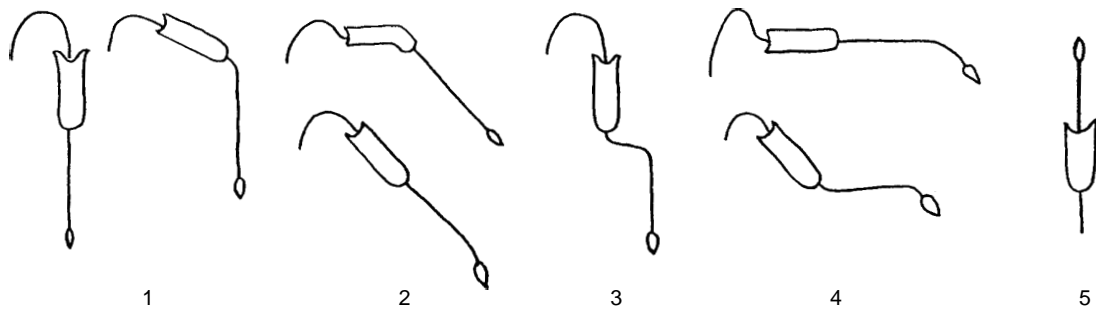


Fig. 8 Rachis position (adapted from De Langhe 1961)

- ★ **6.4.13 Rachis appearance**
- 1 Bare
 - 2 Neutral flowers (one to few hands only, stalk is bare below)
 - 3 Male flowers/bracts above the male bud (but the stalk is bare above flowers/bracts)
 - 4 Neutral/male flowers and presence of withered bracts (on the whole stalk)
 - 5 Neutral/male flowers on the whole stalk without persistent bracts (e.g. AA var. 'Tuu Gia')
 - 6 Small bunch from neutral/hermaphrodite flowers just above the male bud (e.g. ABB var. 'Monthan')
 - 7 Other (specify in descriptor **6.8, Notes**)
- ★ **6.4.14 Male bud type**
- Recorded at maturity
- 1 Normal (present)
 - 2 Degenerating before maturity (like false-horn 'Plantain')
 - 3 Like true-horn 'Plantain' (absent)

★ **6.4.15 Male bud shape**

Note the general shape of the male bud at harvest. (See Fig. 9)

- | | | | |
|---|--------------|---|---------|
| 1 | Like a top | 4 | Ovoid |
| 2 | Lanceolate | 5 | Rounded |
| 3 | Intermediate | | |

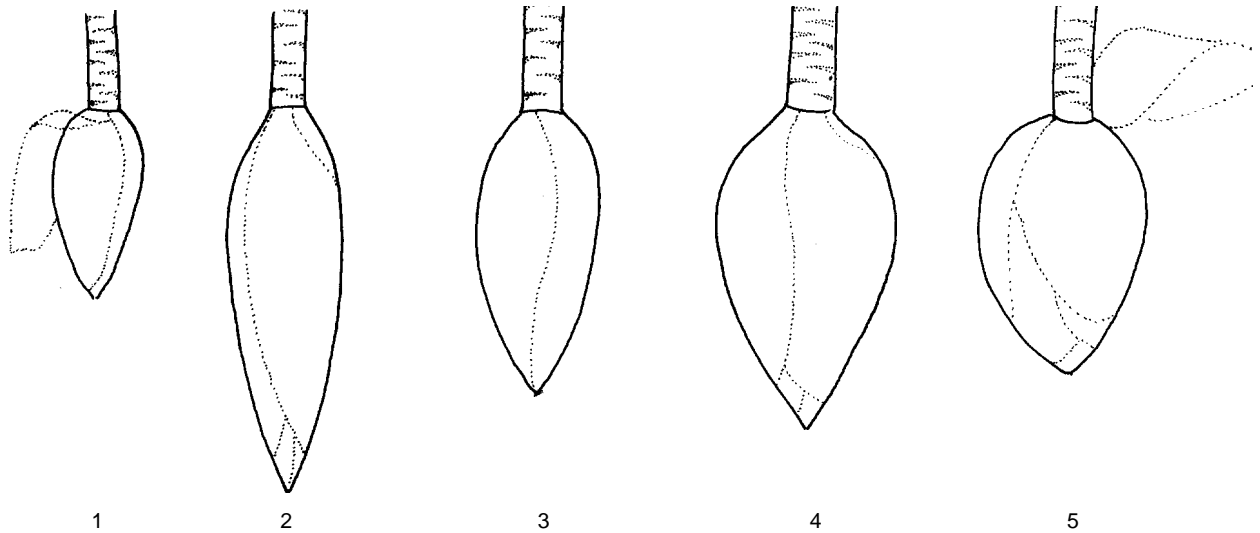


Fig. 9 Male bud shape

6.4.16 Male bud size [cm]

Length and maximum diameter of male bud at harvest

- | | |
|---|-------------|
| 1 | ≤20 cm |
| 2 | 21 to 30 cm |
| 3 | ≥31 cm |

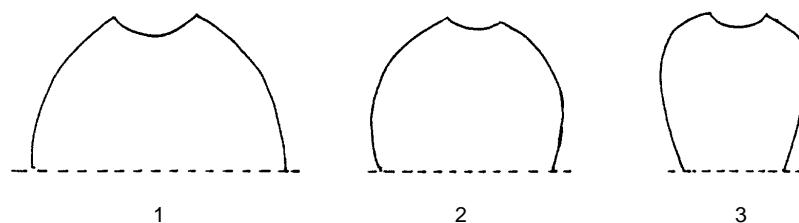
6.5 Bract

Descriptors **6.5.1** to **6.5.14** refer to the first external bract that still clings to the male bud

6.5.1 Bract base shape

(See Fig. 10)

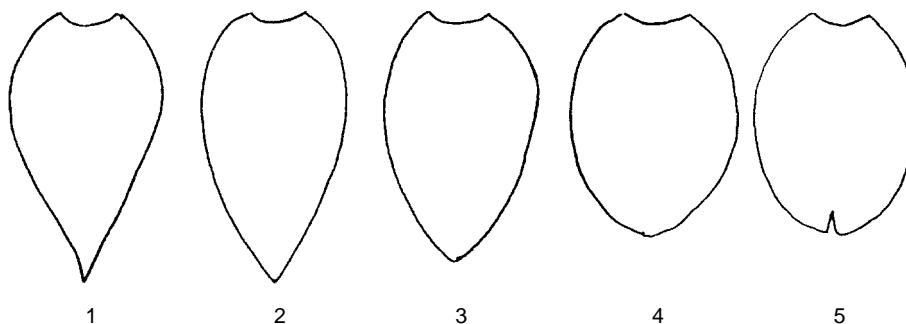
- 1 Small shoulder
- 2 Medium
- 3 Large shoulder

**Fig. 10 Bract base shape****6.5.2 Bract apex shape**

(4.2.12)

Flatten the apex of the bract to observe its shape. (See Fig. 11)

- 1 Pointed
- 2 Slightly pointed
- 3 Intermediate
- 4 Obtuse
- 5 Obtuse and split

**Fig. 11 Bract apex shape****6.5.3 Bract imbrication**

Note alignment of bracts at the apex of the male bud

- 1 Old bracts overlap at apex of bud (like *Musa acuminata* subsp. *malaccensis*)
- 2 Young bracts slightly overlap
- 3 Young bracts greatly overlap (like *Musa acuminata* subsp. *burmanicca*)

★ **6.5.4 Colour of the bract external face** (4.2.11)
(Chart A)

- | | | | |
|---|--------------|----|--|
| 1 | Yellow | 6 | Purple |
| 2 | Green | 7 | Blue |
| 3 | Red | 8 | Pink-purple |
| 4 | Red-purple | 9 | Orange-red |
| 5 | Purple-brown | 10 | Other (specify in descriptor Notes, 6.8) |

★ **6.5.5 Colour of the bract internal face** (4.2.13)
(Chart A)

- | | | | |
|---|-----------------|---|--|
| 1 | Whitish | 5 | Purple |
| 2 | Yellow or green | 6 | Purple brown |
| 3 | Orange red | 7 | Pink-purple |
| 4 | Red | 8 | Other (specify in descriptor Notes, 6.8) |

6.5.6 Colour on the bract apex

Recorded on the external face of the bract

- 1 Tinted with yellow (discoloured)
- 2 Not tinted with yellow (colour is uniform until apex)

6.5.7 Colour stripes on bract

- 1 Without discoloured lines (not ridges) on the external face
- 2 With discoloured lines or stripes on the external face

★ **6.5.8 Bract scars on rachis** (4.2.7)
Recorded on scars left after fall of bracts and flowers

- 1 Very prominent
- 2 Not prominent

★ **6.5.9 Fading of colour on bract base**

Observed on the inside of the bract

- 1 Colour discontinuing towards the base (loss of pigmentation at the base)
- 2 Colour homogenous (pigmentation is uniform and continues until the base)

6.5.10 Male bract shape

(See Fig. 12)

- 1 $x/y < 0.28$ (Lanceolate)
- 2 $0.28 < x/y < 0.30$
- 3 $x/y > 0.30$ (Ovate)

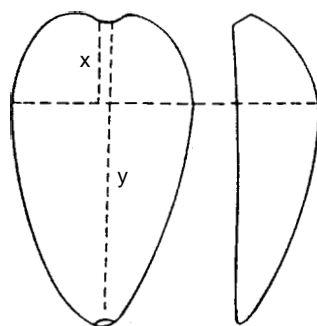


Fig. 12 Male bract shape (from Simmonds and Shepherd 1955)

6.5.11 Male bract lifting

Number of raised bracts present on the male bud

- 1 Not lifting from male bud (bracts are persistent)
- 2 Lifting one at a time
- 3 Lifting two or more at a time

★ 6.5.12 Bract behaviour before falling

(4.2.10)

(See Fig. 13)

- 1 Revolute (rolling)
- 2 Not revolute (not rolling)

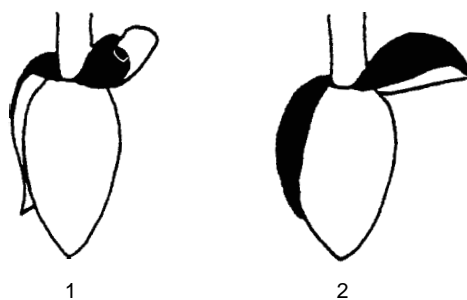


Fig. 13 Bract behaviour before falling

★ 6.5.13 Wax on the bract

Recorded on the external surface

- 1 Very little or no visible sign of wax
- 2 Very few wax
- 3 Moderately waxy
- 4 Very waxy

6.5.14 Presence of grooves on the bract

Observed on the external surface

- 1 Few grooves or not grooved (the bract is completely, or almost completely, smooth)
- 2 Moderate grooving (parallel ridges are distinguishable)
- 3 Strongly grooved (deep parallel furrows on the surface of bract)

6.6 Male flower

(See Fig. 14). Descriptors **6.6.1 to 6.6.25** refer to the flowers at the axil of the first external bract unlifted. At least 10 flowers should be observed

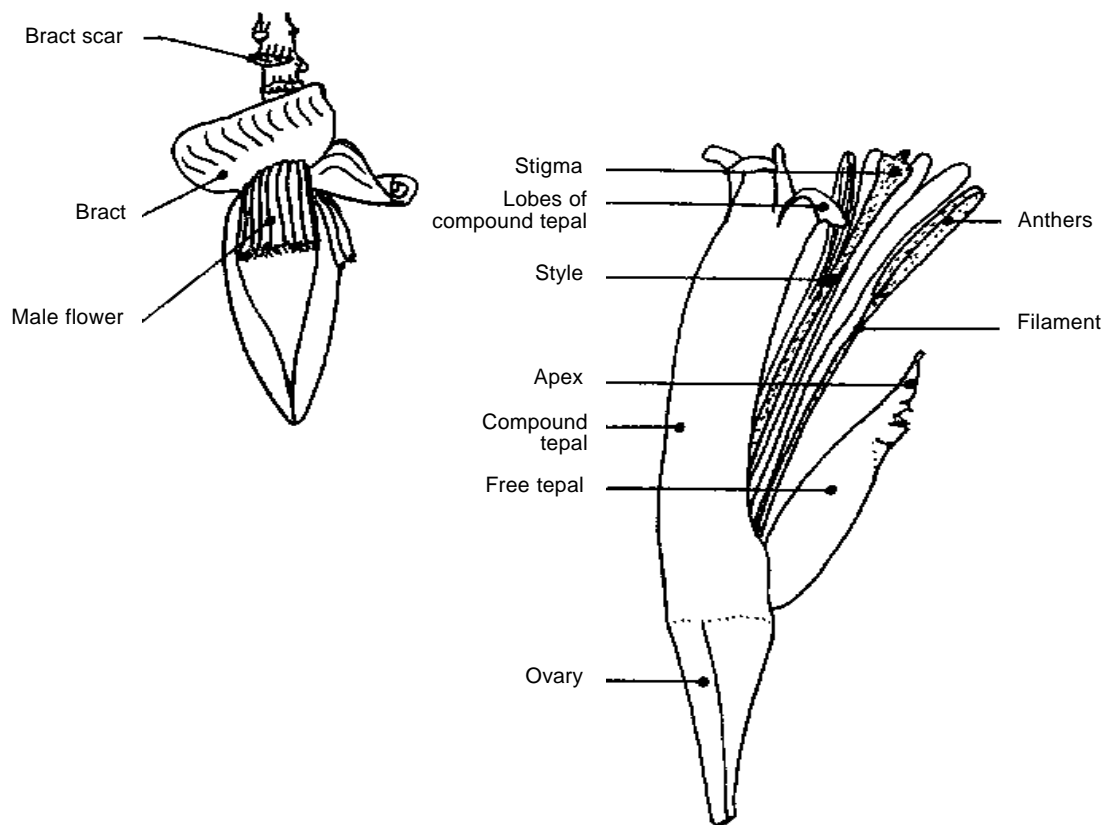


Fig. 14 Male bud and flower (adapted from Champion 1967)

6.6.1 Male flower behaviour

- 1 Falling before the bract
- 2 Falling with the bract
- 3 Falling after the bract
- 4 Neutral/male flowers persistent

- ★ **6.6.2 Compound tepal basic colour**
Without considering lobe colour. (Chart B)
 - 1 White
 - 2 Cream
 - 3 Yellow
 - 4 Orange
 - 5 Pink/pink-purple
 - 6 Other (specify in descriptor **Notes, 6.8**)

- ★ **6.6.3 Compound tepal pigmentation**
 - 1 Very few or no visible sign of pigmentation
 - 2 Rust-coloured spots
 - 3 Presence of pink

- ★ **6.6.4 Lobe colour of compound tepal**
(Chart B)
 - 1 Cream
 - 2 Yellow
 - 3 Orange
 - 4 Green
 - 5 Other (specify in descriptor **Notes, 6.8**)

- 6.6.5 Lobe development of compound tepal**
 - 1 Little or not visible sign of development
 - 2 Developed
 - 3 Very developed

- 6.6.6 Free tepal colour**
 - 1 Translucent white
 - 2 Opaque white
 - 3 Tinted with yellow
 - 4 Tinted with pink

- 6.6.7 Free tepal shape**
 - 1 Rectangular
 - 2 Oval
 - 3 Rounded
 - 4 Fan-shaped

- ★ **6.6.8 Free tepal appearance**
 - 1 Simple folding under apex
 - 2 More or less smooth
 - 3 Several folding under apex (corrugated)

6.6.9 Free tepal apex development

(See Fig. 15)

- 1 Little or no visible sign of development
- 2 Developed
- 3 Very developed

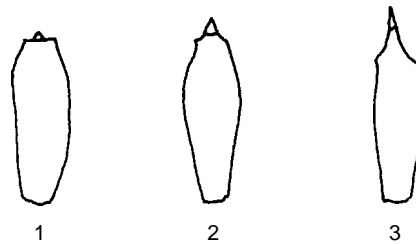


Fig. 15 Free tepal apex development

6.6.10 Free tepal apex shape

- 1 Thread-like
- 2 Triangular
- 3 Obtuse

6.6.11 Anther exsertion

In relation to the base of the lobes on the compound tepal

- 1 Exserted
- 2 Same level
- 3 Inserted

6.6.12 Filament colour

(Chart B)

- 1 White
- 2 Cream
- 3 Yellow

6.6.13 Anther colour

Observed on the face opposite to the dehiscence split of the anther (dorsal face).

(Chart B)

- | | |
|----------|--|
| 1 White | 5 Brown/rusty brown |
| 2 Cream | 6 Pink/pink-purple |
| 3 Yellow | 7 Black (anthers aborted) |
| 4 Grey | 8 Other (specify in descriptor Notes, 6.8) |

6.6.14 Pollen sac colour

Recorded at the line where the anther splits to release pollen. (Chart B)

- | | |
|---------------------|--|
| 1 White | 5 Pink/pink-purple |
| 2 Cream | 6 Red-purple |
| 3 Yellow | 7 Other (specify in descriptor Notes, 6.8) |
| 4 Brown/rusty brown | |

★ **6.6.15 Pollen vitality [%]**

Percentage of deformed and/or aborted grains in relation to normal grains. Use Alexander's pollen viability assessment method (See references)

6.6.16 Style basic colour

Do not refer to the minute blotches which can be present on the style (Descriptor **6.6.17**). (Chart B)

- | | |
|---------|--|
| 1 White | 3 Red-purple |
| 2 Cream | 4 Other (specify in descriptor Notes, 6.8) |

6.6.17 Pigmentation on style

- 1 Without pigmentation
- 2 Purple

6.6.18 Style exsertion

In relation to the base of the lobes on the compound tepal

- 1 Exserted
- 2 Same level
- 3 Inserted

★ **6.6.19 Style shape**

(See Fig. 16)

- | | |
|-----------------------|--|
| 1 Straight | 4 Curved twice |
| 2 Curved under stigma | 5 Other (specify in descriptor Notes, 6.8) |
| 3 Curved at the base | |

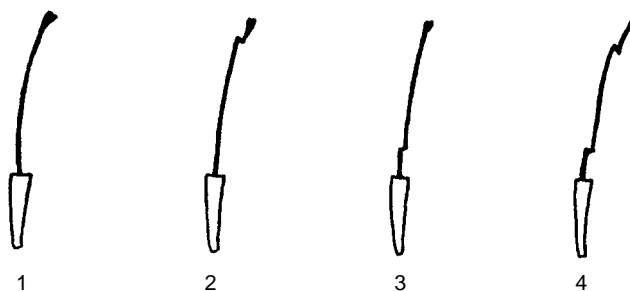


Fig. 16 Style shape

- ★ **6.6.20 Stigma colour**
(Chart B)
- 1 Cream
 - 2 Yellow
 - 3 Pink/pink-purple
 - 4 Bright yellow
 - 5 Orange
 - 6 Other (specify in descriptor **Notes, 6.8**)

- 6.6.21 Ovary shape**
(See Fig. 17)
- 1 Straight
 - 2 Arched

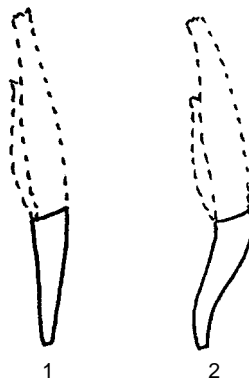


Fig. 17 Ovary shape

- ★ **6.6.22 Ovary basic colour**
(Chart B)
- | | |
|----------|--------------------------------|
| 1 White | 4 Green |
| 2 Cream | 5 Other (specify in descriptor |
| 3 Yellow | Notes, 6.8) |

- ★ **6.6.23 Ovary pigmentation**
- 1 Very few or no visible sign of pigmentation
 - 2 With red-purple

- 6.6.24 Dominant colour of male flower**
(Chart B)
- | | |
|----------|--|
| 1 White | 4 Pink/pink-purple |
| 2 Cream | 5 Red-purple |
| 3 Yellow | 6 Other (specify in descriptor Notes, 6.8) |

6.6.25 Irregular flowers

Record number of flowers per cluster with an abnormal number of stamens, fusion of free and compound tepal, etc.

6.6.26 Arrangement of ovules

(6.2.1)

Observed soon after flowering and before the fruit fills. Observe a cross-section of a fruit. (See Fig. 18)

- 1 Two rowed
- 2 Four-rowed (more or less)

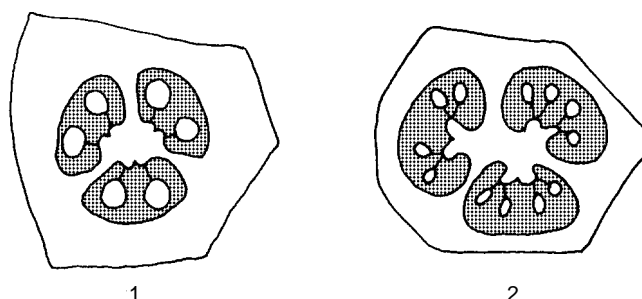


Fig. 18 Arrangement of ovules (adapted from Simmonds and Shepherd 1955)

6.7 Fruit

For the following descriptors, records should be made on the inner fruit in the middle of the mid-hand of the bunch, at harvest time (first fruit ripening on bunch)

6.7.1 Fruit position

Recorded only on fruits arranged symmetrically around the stalk

- 1 Curved towards stalk
- 2 Parallel to the stalk
- 3 Curved upward (obliquely, at a 45° angle upward)
- 4 Perpendicular to the stalk
- 5 Pendant

**6.7.2 Number of fruits**

(4.2.5)

Observed on the mid-hand of the bunch

- 1 ≤ 12
- 2 13-16
- 3 ≥ 17

- ★ **6.7.3 Fruit length [cm]**
 Measured as the internal arc of the fruit, without pedicel
- 1 ≤15 cm
 - 2 16- 20 cm
 - 3 21- 25 cm
 - 4 26- 30 cm
 - 5 ≥31 cm

- ★ **6.7.4 Fruit shape (longitudinal curvature)** (4.2.7)
 (See Fig. 19)
- 1 Straight (or slightly curved)
 - 2 Straight in the distal part
 - 3 Curved (sharp curve)
 - 4 Curved in 'S' shape (double curvature)
 - 5 Other (specify in descriptor **Notes, 6.8**)

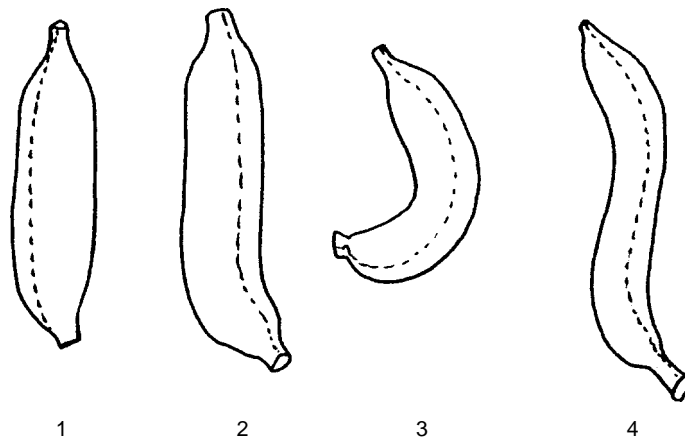


Fig. 19 Fruit shape (longitudinal curvature) (adapted from Dodds and Simmonds 1948)

- ★ **6.7.5 Transverse section of fruit** (6.2.4)
 Observed on mature fruit ('ready to eat' - ripe but not over-ripe, full yellow stage).
 (See Fig. 20)
- 1 Pronounced ridges
 - 2 Slightly ridged
 - 3 Rounded

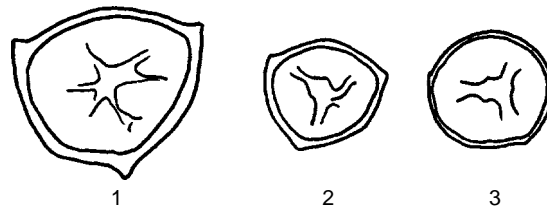


Fig. 20 Transverse section of fruit (adapted from Dodds and Simmonds 1948)

★ **6.7.6 Fruit apex** (4.2.8)

Observed at the distal end of the fruit. (See Fig. 21)

- 1 Pointed
- 2 Lengthily pointed
- 3 Blunt-tipped
- 4 Bottle-necked
- 5 Rounded

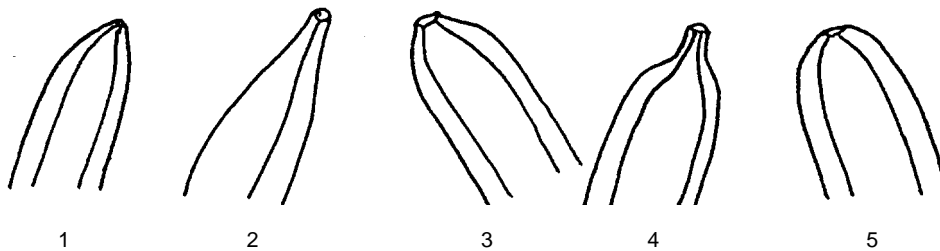


Fig. 21 Fruit apex (adapted from Champion 1967)

6.7.7 Remains of flower relicts at fruit apex

Observed at the distal end of the fruit. (See Fig. 22)

- 1 Without any floral relicts
- 2 Persistent style
- 3 Base of the style prominent

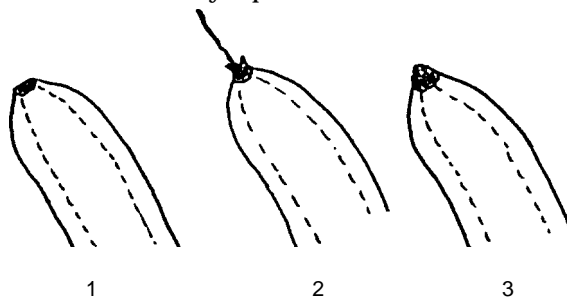


Fig. 22 Remains of flower relicts at fruit apex

6.7.8 Fruit pedicel length [mm]

- 1 ≤10 mm
- 2 11 to 20 mm
- 3 ≥21 mm

6.7.9 Fruit pedicel width [mm]

- 1 <5 mm
- 2 5 to 10 mm
- 3 >10 mm

6.7.10 Pedicel surface

- 1 Hairless
- 2 Hairy

6.7.11 Fusion of pedicels

(Before joining the crown)

- 1 Very partially or no visible sign of fusion
- 2 Partially fused
- 3 Totally fused

6.7.12 Immature fruit peel colour

(6.2.5)

Recorded on the youngest hand of the bunch, before maturity. (Chart B)

- 1 Yellow
- 2 Light green
- 3 Green
- 4 Green and pink, red or purple
- 5 Silvery
- 6 Dark green
- 7 Brown/rusty brown
- 8 Pink, red or purple
- 9 Black
- 10 Other (e.g. bluish, specify in descriptor **Notes, 6.8**)

★ **6.7.13 Mature fruit peel colour**

Recorded at fruit maturity (ripe, but not over-ripe; full yellow stage). (Chart B)

- 1 Yellow
- 2 Bright yellow
- 3 Orange
- 4 Grey spots
- 5 Brown/rusty-brown
- 6 Orange red, red or pink/pink purple
- 7 Red-purple
- 8 Black
- 9 Other (specify in the descriptor **Notes, 6.8**)

6.7.14 Fruit peel thickness [mm]

Recorded at fruit maturity ('ready to eat' ripe, but not over-ripe; full yellow stage)

- 1 Two or less
- 2 Three or more

6.7.15 Adherence of the fruit peel

Recorded at fruit maturity (ripe, but not over-ripe; full yellow stage)

- 1 Fruit peels easily
- 2 Fruit does not peel easily

6.7.16 Cracks in fruit peel

Recorded at fruit maturity if the peel splits without mechanical damage

- 1 Without cracks
- 2 Cracked

**6.7.17 Pulp in fruit**

- 1 Without pulp
- 2 With pulp

6.7.18 Pulp colour before maturity

Recorded on youngest hand of the bunch. (Chart B)

- 1 White
- 2 Cream
- 3 Ivory
- 4 Yellow
- 5 Orange
- 6 Beige-pink
- 7 Other (specify in descriptor **Notes, 6.8**)

**6.7.19 Pulp colour at maturity**

(Chart B). (Ripe, but not over-ripe; full yellow stage)

- 1 White
- 2 Cream
- 3 Ivory
- 4 Yellow
- 5 Orange
- 6 Beige-pink
- 7 Other (specify in descriptor **Notes, 6.8**)

6.7.20 Fruits fall from hands

Observed at fruit maturity

- 1 Persistent
- 2 Deciduous

6.7.21 Flesh texture

- 1 Firm
- 2 Soft

6.7.22 Predominant taste

(4.2.6)

- 1 Astringent (like cooking banana)
- 2 Mild, slightly tasty or tasteless
- 3 Sweet (like Cavendish)
- 4 Sugary (like 'Pisang Mas')
- 5 Sweet and acidic (apple like)
- 6 Other (specify in descriptor **Notes, 6.8**)

**6.7.23 Presence of seed with source of pollen**

Record the number of seeds only if there exists in the vicinity of the plant a population of wild relatives, or male fertile hybrids (pollen sources), or if the female flowers are artificially pollinated

- 1 <5
- 2 5-20
- 3 >20

6.7.24 Seed surface

- 1 Smooth
- 2 Wrinkled

**6.7.25 Seed shape**

(4.3.1)

- 1 Flat
- 2 Angular (more or less pyramidal)
- 3 Globular (spherical)
- 4 Rounded (but not completely spherical)

6.8 Notes

Any additional information, especially in the category of 'other' under various descriptors above, may be specified here

EVALUATION

7. Plant descriptors

Observations should be made at harvest, when the first ripe fruit develops on the bunch.
Record mean and standard deviation

★ **7.1 Cycle under evaluation**

Specify which cycle is observed for the next characters

- 1 Cycle 1
- 2 Cycle 2 and following

★ **7.2 Number of plants evaluated**

★ **7.3 Planting to shooting [d]**

From planting until the emergence of the first bract

★ **7.4 Plant crop cycle [d]**

From planting to harvest

7.5 Ratoon crop cycle 2 [d]

Number of days between two successive harvests

★ **7.6 Pseudostem height [cm]**

From base of pseudostem to the point of bunch emergence

7.7 Pseudostem girth [cm]

Measured at 1 m from base of pseudostem

7.8 Height of following ratoon [cm]

Measured from base of pseudostem to last leaf axil

★ **7.9 Bunch weight [kg]**

Bunch stalk (peduncle) is cut above the first hand at the level of the last scar and immediately below the last hand

★ **7.10 Number of hands**

★ **7.11 Number of fruits**

7.12 Fruit length [cm]

Recorded on the central external fruit of the middle hand

7.13 Fruit diameter [mm]

Recorded on the central external fruit of the middle hand

★ **7.14 Fruit weight [g]**

Average: divide the collective weight of the hands (cut from the peduncle) by the number of fruits

★ **7.15 Number of living (functional) leaves at flowering**

★ **7.16 Number of living (functional) leaves at harvest**

7.17 Notes

Specify here any additional information

8. Abiotic stress susceptibility

Scored under artificial and/or natural conditions, which should be clearly specified. These are coded on a susceptibility scale from 1 to 9:

- 1 Very low or no visible sign of susceptibility
- 3 Low
- 5 Intermediate
- 7 High
- 9 Very high

8.1 Low temperature (7.1)

8.2 Drought (7.3)

8.3 Flooding

8.4 Mineral deficiencies

8.5 Winds

8.6 Soil acidity

8.7 Manganese toxicity

8.8 High temperature

8.9 Notes

Specify here any additional information

9. Biotic stress susceptibility

In each case, it is important to state the origin of the infestation or infection, i.e. natural, field inoculation, laboratory. Record such information in descriptor **9.3 Notes**. These are coded on a susceptibility scale from 1 to 9, viz:

- 1 Very low or no visible sign of susceptibility
- 3 Low
- 5 Intermediate
- 7 High
- 9 Very high

Asterisks (*) in sections **9.1** - **9.2** indicate the organisms considered most important by breeders or pathologists

9.1 Diseases

	Causal organism	Common name
9.1.1	* <i>Mycosphaerella musicola</i>	Sigatoka/yellow Sigatoka
9.1.2	* <i>Mycosphaerella fijiensis</i>	Black leaf streak/black Sigatoka
9.1.3	* <i>Fusarium oxysporum</i> f.sp. <i>cubense</i> Specify VCG group if known	Fusarium wilt/ Panama Disease (8.2.1)
9.1.4	* <i>Pseudomonas solanacearum</i>	Moko, Bugtok (8.3.1) Blood disease
9.1.5	<i>Cylindrocadium</i> sp.	

9.2 Pests

9.2.1	* <i>Radopholus similis</i>	Burrowing nematode (8.1.2)
9.2.2	* <i>Pratylenchus coffeae</i>	Root lesion nematode
9.2.3	* <i>Pratylenchus goodeyi</i>	Root lesion nematode
9.2.4	* <i>Cosmopolites sordidus</i>	Weevil borer (8.1.1)
9.2.5	<i>Meloidogyne</i> sp.	
9.2.6	<i>Helicotylenchus multicinctus</i>	

9.3 Notes

Specify here any additional information, such as fruit diseases

10. Biochemical markers

10.1 Isozyme

For each enzyme, indicate the tissue analyzed and the zymogram type. A particular enzyme can be recorded as 10.1.1; 10.1.2, etc.

10.2 Other biochemical markers

(e.g. Flavonoid and polyphenol profiles)

11. Molecular markers

Describe any specific discriminating or useful trait for this accession. Report probe-enzyme combination analyzed.

11.1 Restriction Fragment Length Polymorphism (RFLP)

11.2 Random Amplified Polymorphic DNA (RAPD)

11.3 Specific Amplicon Polymorphism (SAP)

11.4 Microsatellites

11.5 Other molecular markers

12. Cytological characters

★ 12.1 Somatic chromosome number

★ 12.2 Ploidy level

(2x, 3x, 4x)

12.3 Other cytological characters

(e.g. trisomics, monosomics, B chromosomes)

13. Identified genes

Refers to any gene identified for any of the morphological and biochemical characters. List all identified genes.

REFERENCES

- Alexander, M.P. 1969. Differential staining of aborted and nonaborted pollen. *Stain. Technol.* 44:117-122.
- Champion, J. 1963. *Le Bananier*. Maisonneuve et Larose eds, Paris, France, 263 p.
- Champion, J. 1967. *Les bananiers et leur culture; tome I: botanique et génétique*. SETCO eds, Paris, France, 214 p.
- De Langhe, E. 1961. La taxonomie du bananier plantain en Afrique Equatoriale. *J. d'Agric. Tropicale et de Botanique Appliquée*, VIII, 10-11:417-449.
- Dodds, K.S. and N.W. Simmonds. 1948. Genetical and cytological studies of *Musa*. IX. The origin of an edible diploid and the significance of interspecific hybridization in the banana complex. *J. of Genet.* 48, 3:285-296.
- FAO. 1990. *Guidelines for Soil Profile Description*, 3rd edition (revised). Food and Agriculture Organization of the United Nations, International Soil Reference Information Centre, Land and Water Development Division. FAO, Rome.
- IBPGR. 1984. *Revised Banana Descriptors*. AGP: IBPGR/83/11. IBPGR Secretariat, Rome. 31 p.
- Kornerup, A. and J.H. Wanscher. 1984. *Methuen Handbook of Colour*. Third edition. Methuen, London. ISBN 0-413-33400-7.
- Munsell Color. 1977. *Munsell Color Charts for Plant Tissues*, 2nd edition, revised. Munsell Color, Macbeth Division of Kollmorgen Corporation, 2441 North Calvert Street, Baltimore, Maryland 21218, USA.
- Rana, *et al.* 1991. *Documentation and Information Management. Plant Genetic Resources*. National Bureau of Plant Genetic Resources (ICAR), New Delhi. 188 p.
- Royal Horticultural Society, 1966, c. 1986. *R.H.S. Colour Chart* (edn. 1, 2). Royal Horticultural Society, London.
- Simmonds, N.W. and K. Shepherd. 1955. The taxonomy and origins of the cultivated bananas. *J. Linn. Soc. Bot.* LV: 302-312.
- UPOV. 1989. *Guidelines for the conduct of tests for distinctness, homogeneity and stability. Banana (Musa acuminata Colla)*. TG/123/3. International Union for the Protection of New Varieties and Plants (UPOV), Geneva. 26 p.
- van Hintum, Th. J.L. 1993. A computer compatible system for scoring heterogeneous populations. *Genet. Resour. and Crop Evolution* 40:133-136.

CONTRIBUTORS

Dr Silvio Belalcazar
Coordinador Nacional, Programa Plátano
ICA/Centro de Diagnóstico
Sector Regivit 28 Norte,
Apartado Aéreo 1069
Armenia, Quindo
COLOMBIA

Dr F. Carreel
CIRAD-FLHOR
Station de Neufchâteau
Sainte Marie
F-97130 Capesterre-Belle-Eau
GUADELOUPE

Ching-Yan Tang
Plant Breeder
Taiwan Banana Research Institute - TBRI
Variety Improvement Section
PO Box 18, Chiuju
Pingtung 90403, R.O.C.
TAIWAN

Dr Jeff Daniells
DPI Queensland
Centre for Wet Tropics Agriculture
PO Box 20
South Johnstone, QLD 4859
AUSTRALIA

Prof. Bruno Delvaux
Université Catholique de Louvain
Dep. des Sciences du Milieu et
Aménagement du Territoire
Unité des Sciences du Sol
Place Croix du Sud, 2/10
1348 Louvain-la-neuve
BELGIUM

Mr Guy Evers
FAO
Investment Center Division
TCIR Service (D-681)
Via delle Terme di Caracalla
00100 Roma
ITALY

Dr Victor Galan Sauco
Jefe del Departamento
CITA
Dep. de Fruticultura Tropical
Apartado aéreo 60
38200 La laguna
Tenerife (Canarias)
SPAIN

Dr Ricardo Goenaga
USDA-ARS Research Leader
PO Box 70
Route 65 & 108
Mayaguez PR 00681
USA

Prof. Oscar Haddad
Facultad de Agronomía
Universidad Central de Venezuela
Apartado postal 4579
El Limón, Maracay
VENEZUELA

Dr Yair Israelei
Jordan Valley Banana Exp. Station
Zemach 15132
ISRAEL

Mr Christophe Jenny
Chargé de la collection Musa
CIRAD-FLHOR
Station de Neufchâteau
Sainte Marie
F-97130 Capesterre-Belle-Eau
GUADELOUPE

Mrs Deborah Karamura
University of Reading
School of Plant Sciences
Dept. of Agricultural Botany
Whiteknights, Box 221
Reading RG6 2AS
UNITED KINGDOM

Dr Emmanuel Lahav
ARO
Institute of Horticulture
The Volcani Center, PO Box 6
Bet-Dagan 50250
ISRAEL

Mr Christian Lavigne
CIRAD/FLHOR
B.P. 32 La Foa
NOUVELLE CALEDONIE

Mr Thierry Lescot
CIRAD-FLHOR
c/o CATIE
A.A. 104
Turrialba
COSTA RICA

Dr Rodomiro Ortiz
IITA
High Rainfall Station
PMB 008
Nchia-Elleme, Telga
Onne, Rivers State
NIGERIA

Mr Orlando C. Pascua
Davao National Crop Research and
Development Center
BPI
Bago Oshiro
8000 Davao City
PHILIPPINES

Mr Xavier Perrier
CIRAD-FLHOR
2477, ave. Du Val de Montferrand
BP 5035
34032 Montpellier Cedex 1
FRANCE

Dr Franklin Rosales
FHIA
PO BOX 2067
San Pedro Sula
HONDURAS

Ing. Irelio Sanchez Ramos
Jefe Recursos Fitogeneticos
INIVIT
53000 Santo Domingo
Villa Clara
CUBA

Prof Rony Swennen
KUL
Laboratory of Tropical Crop Improvement
Kardinaal Mercierlaan 92
3001 Heverlee
BELGIUM

Mr Hughes Tezenas du Montcel
Banana Programme (Head)
CIRAD-FLHOR
2477, ave. Du Val de Montferrand
BP 5035
34032 Montpellier Cedex 1
FRANCE

Dr Kodjo Tomekpe
Banana Germplasm Curator and Breeder
CRBP
BP 832
Douala
CAMEROON

Ir. Ines Van den houwe
Officer in Charge
INIBAP Transit Center - KUL
Laboratory of Tropical Crop Improvement
Kardinaal Mercierlaan 92
3001 Heverlee
BELGIUM

ACKNOWLEDGEMENTS

IPGRI-INIBAP and CIRAD wish to place on record their sincere thanks to the numerous *Musa* workers around the world who have contributed directly or indirectly to the development of the Descriptors for banana.

Mr H. Tezenas du Montcel, Mr C. Jenny and Dr X. Perrier from CIRAD-FLHOR have contributed to the development of the characterization form, which has been translated into English by Ms S. Sharrock (IBPGR) and into Spanish by Mr T. Lescot (CIRAD).

Translation from French into English has been performed by Dr D.R. Jones, Ms E Arnaud and Dr J.P. Horry.

Ms Adriana Alercia coordinated and supervised the text up to the pre-publication stage and provided technical advice. Ms Linda Sears edited the text and Ms Patrizia Tazza drew the cover, some illustrations, and prepared the layout. Scientific direction was provided by Dr Jean-Pierre Horry. Mr Paul Stapleton managed the production of the publication.

LIST OF DESCRIPTORS

Almond (revised) * (E)	1985	Papaya (E)	1988
Apple (E)	1982	Peach * (E)	1985
Apricot * (E)	1984	Pear * (E)	1983
Avocado (E,S)	1995	Pearl millet (E,F)	1993
Bambara groundnut (E)	1987	<i>Phaseolus acutifolius</i> (E)	1985
Banana (revised) * (E)	1984	<i>Phaseolus coccineus</i> * (E)	1983
Barley (E)	1994	<i>Phaseolus vulgaris</i> * (E)	1982
Beta (E)	1991	Pigeonpea (E)	1993
Black pepper (E,S)	1995	Pineapple (E)	1991
<i>Brassica</i> and <i>Raphanus</i> (E)	1990	Plum * (E)	1985
<i>Brassica campestris</i> L. (E)	1987	Potato variety * (E)	1985
Buckwheat (E)	1994	Quinoa * (E)	1981
Capsicum (E,S)	1995	Rice * (E)	1980
Cardamom (E)	1994	Rye and Triticale * (E)	1985
Cashew (E)	1986	Safflower * (E)	1983
Cherry * (E)	1985	Sesame * (E)	1981
Chickpea (E)	1993	<i>Setaria italica</i>	
Citrus (E)	1988	and <i>S. pumilia</i> (E)	1985
Coconut (E)	1992	Sorghum (E,F)	1993
Coffee (E,S,F)	1996	Soyabean * (E,C)	1984
Colocasia * (E)	1980	Strawberry (E)	1986
Cotton (Revised) (E)	1985	Sunflower * (E)	1985
Cowpea (E)	1983	Sweet potato (E,S,F)	1991
Cultivated potato * (E)	1977	Tomato (E, S, F)	1996
Echinochloa millet * (E)	1983	Tropical fruit * (E)	1980
Eggplant (E,F)	1990	<i>Vigna aconitifolia</i>	
Faba bean * (E)	1985	and <i>V. trilobata</i> (E)	1985
Finger millet (E)	1985	<i>Vigna mungo</i>	
Forage grass * (E)	1985	and <i>V. radiata</i> (Revised) * (E)	1985
Forage legumes * (E)	1984	Walnut (E)	1994
Grape * (E)	1983	Wheat (Revised) * (E)	1985
Groundnut (E,S,F)	1992	Wheat and <i>Aegilops</i> * (E)	1978
Kodo millet * (E)	1983	White Clover (E)	1992
Lentil * (E)	1985	Winged Bean * (E)	1979
Lima bean * (E)	1982	Xanthosoma (E)	1989
Lupin/Lupinos * (E,S)	1981	Yams * (E)	1980
Maize (E,S,F)	1991		
Mango (E)	1989		
Medicago (Annual) * (E,F)	1991		
Mung bean * (E)	1980		
Oat * (E)	1985		
Oca * (S)	1982		
Oil palm (E)	1989		
<i>Panicum miliaceum</i>			
and <i>P. sumatrense</i> (E)	1985		

IPGRI publications are available free of charge to the libraries of genebanks, university departments, research institutions, etc. On request to Head, Editorial and Publications Unit, titles may also be made available to individuals who can show that they have a need for a personal copy of a publication. E, F, S and C indicate English, French, Spanish, and Chinese, respectively. Titles marked with * are available only as photocopies.